REMARKS

The present Amendment amends claims 1-4, 6, 8-11, 13, 15-17, 19 and 20, and leaves claims 5, 7, 12, 14, and 18 unchanged. Therefore, the present application has pending claims 1-20.

35 U.S.C. §112 Rejections

Claims 2-5, 9-13 and 15 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Specifically, the Examiner alleges that "theoretical performance value" and "forecasted performance value" are unclear. The Examiner cites definitions for "theoretical" and "forecasted" and concludes that the theoretical performance value should be interpreted as the expected availability and the forecasted performance value should be interpreted as the desired threshold minus current usage.

However, as discussed at length in the previous Office Action, Applicants kindly remind the Examiner that when the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to achieve a complete exploration of Applicants' invention and its relation to the prior art. *In re Zletz*, 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989) (see MPEP 2173.05(a)(I)). As such, the Examiner's attention is directed to portions of the specification (see generally, for example, page 20, line 8 to page 21, line 23), which state the meaning that "theoretical performance value" and "forecasted performance value" are intended to have.

In response to Applicants' arguments, the Examiner acknowledges that the claims are read in light of the specification, but contends that the specification is not read into the claims. Although Applicants respectfully disagree with the Examiner's

interpretation of the law as clearly provided in *In re Zletz*, Applicants have amended the claims, where appropriate, in view of the Examiner's comments. Therefore, Applicants submit that claims 2-5, 9-13 and 15, as now more clearly recited, are in compliance with 35 U.S.C. §112, and the rejection of claims 2-5, 9-13 and 15 should be withdrawn.

35 U.S.C. §103 Rejections

Claims 1 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 20040120225 to Dalal in view of in view of U.S. Patent No. 6,035,306 to Lowenthal. This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 1 and 18, are not taught or suggested by Dalal or Lowenthal, whether taken individually or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to so as to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly describe that the present invention is directed to a volume allocating method in a storage management system as recited, for example, in independent claim 1.

The present invention, as recited in claim 1, provides a volume allocating method in a storage management system for managing the operation of a storage device connected via a network by use of a storage management server. The method includes a step of receiving, via the network, a condition for allocating a volume, where the condition is designated by a client. The method also includes

obtaining information on operation history information of the storage device from a memory device for storing historical information, including a performance value of a disk group obtained upon actually operating the storage device. Another step includes obtaining specification values from the storage device, where the specification values include the performance value of the storage device. Furthermore, the method includes determining at least one candidate of an allocable volume by obtaining a performance margin and using the performance margin to determine at least one candidate of an allocable volume in accordance with the received condition for allocating the volume and based on the operation history information of the storage device and the information on the specification values of the storage device. Also included in the method are steps of transmitting information regarding the volume of the at least one candidate to the client, receiving the information on the volume of the at least one candidate in the client, and receiving from the client a request to allocate a volume selected from the at least one candidate. The method also includes allocating the volume to the storage device in accordance with the information on the volume selected from the at least one candidate. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record, particularly Dalal or Lowenthal, whether taken individually or in combination with each other.

Dalal discloses a language for expressing storage allocation requirements. However, there is no teaching or suggestion in Dalal of the volume allocating method in a storage management system of the present invention, as recited in claim 1.

Dalal's language for expressing storage allocation requirements provides keywords and rules corresponding to commands for configuring a set of storage devices to provide requested capabilities of a logical volume. The language also provides keywords and constructs for defining capabilities. The language supports direct inheritance of a capability, where a template specifies another template that contains rules to be used to provide a given capability. The language also supports indirect inheritance of a capability, where a template requires a capability but does not provide an implementation of the capability. In addition, the language is processed to "merge" rules by selecting a single storage device that conforms to more than one rule when possible. Merging rules enables a minimum number of storage devices to be used to meet a given logical volume configuration and set of capabilities.

One feature of the present invention, as recited in claim 1, includes determining at least one candidate of an allocable volume by obtaining a performance margin and using the performance margin to determine at least one candidate of an allocable volume in accordance with the received condition for allocating the volume and based on the operation history information of the storage device and the information on the specification values of the storage device. Dalal does not disclose this feature.

To support the assertion that Dalal discloses obtaining a performance margin, the Examiner cites paragraph [0138], lines 1-12, and alleges that the "performance parameter" of Dalal corresponds to the performance margin of the present invention. However, a performance parameter and a performance margin are quite different. Specifically, the values for capabilities such as high performance or medium

performance level of Dalal do not amount to a performance margin of the present invention. A level of performance, such as high or low, is not the same as a margin. Therefore, Dalal does not teach or suggest obtaining a performance margin and further does not teach or suggest determining at least one candidate of an allocable volume by obtaining a performance margin, in the manner claimed.

The Examiner further cites paragraphs [0088], lines 1-7, [0086], lines 2-19, and [101], line 10-21 to support the assertion that Dalal discloses where a candidate of an allocable volume is determined in accordance with the received condition for allocating the volume. However, neither the cited text nor any other portion of Dalal discloses the use of a performance margin to determine a candidate of an allocable volume. Therefore, Dalal does not teach the claimed feature.

Therefore, Dalal fails to teach or suggest "determining at least one candidate of an allocable volume by obtaining a performance margin and using the performance margin to determine the at least one candidate of an allocable volume in accordance with the received condition for allocating the volume and based on the information on the operation history of the storage device and the information on specification values of the storage device" as recited in claim 1.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, namely Lowenthal, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal and Lowenthal in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

Lowenthal teaches a method for improving the performance of large databases. However, there is not teaching or suggestion in Lowenthal of the volume

allocating method in a storage management system of the present invention, as recited in claim 1.

Lowenthal provides a tool with which a database administrator can analyze a very large database (VLDB) at all levels of data storage, both logical and physical, to analyze performance problems. The invention is particularly applicable to systems in which database files are striped over multiple disk drives. In Lowenthal, storage of information is monitored at three levels: database files; file system files; and individual disk drives. Parameters indicating the activity and performance level of each of the levels of storage are taken at selected intervals and stored. An analysis tool is provided that allows a database administrator to select a time window during which the database performance is to be assessed. The analysis tool has a map of the logical and physical arrangement of the database being monitored and allows a database administrator to move from level to level of both logical and physical structures involved in storing the data while displaying I/O activity in an easily understood manner.

One feature of the present invention, as recited in claim 1, includes determining at least one candidate of an allocable volume by obtaining a performance margin and using the performance margin to determine at least one candidate of an allocable volume in accordance with the received condition for allocating the volume and based on the operation history information of the storage device and the information on the specification values of the storage device. Lowenthal does not disclose this feature, and the Examiner does not rely upon Lowenthal for teaching obtaining a performance margin to determine a candidate in accordance with a received condition, as claimed.

Therefore, Lowenthal fails to teach or suggest "determining at least one candidate of an allocable volume by obtaining a performance margin and using the performance margin to determine the at least one candidate of an allocable volume in accordance with the received condition for allocating the volume and based on the information on the operation history of the storage device and the information on specification values of the storage device" as recited in claim 1.

Both Dalal and Lowenthal suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Dalal and Lowenthal in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 1 and 18 as being unpatentable over Dalal in view of Lowenthal are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 1 and 18.

Claims 2-17, 19 and 20

Claims 2-17, 19 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dalal in view of Lowenthal, further in view of Leung. This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 2-17, 19 and 20, are not taught or suggested by Dala, Lowenthal or Leung, whether taken individually or in combination with each other in the manner suggested by the Examiner. Therefore,

Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to so as to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly describe that the present invention is directed to a storage management server or a program for selecting and generating a volume candidate, as recited, for example, in independent claims 4, 9 and 11, and a volume allocating method as recited, for example, in dependent claim 2.

Dependent Claim 2

The present invention, as recited in dependent claim 2, includes a volume allocating method according to claim 1, further including a step of storing previously, in the memory device, a plurality of policies. One of the policies is selected by designating the condition for allocating the volume in the client, and each of the policies includes information regarding at least the performance value and an operating time zone. The method also includes a step of storing previously, in the memory device, information regarding a forecasted performance value per unit time, a theoretical performance value, and information regarding the operation history of the volume in the disk group as an allocation target. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history of a capacity. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. The prior art does not teach all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by Dalal, Lowenthal or Leung, whether taken individually or in combination with each other.

As previously discussed, Dalal discloses a language for expressing storage allocation requirements. However, there is not teaching or suggestion in Dalal of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11.

One feature of the present invention, as recited in claim 2, includes a step of storing previously, in the memory device, information regarding a forecasted performance value per unit time, a theoretical performance value, and information regarding the operation history of the volume in the disk group as an allocation target. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history of a capacity. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. As conceded by the Examiner, Dalal does not disclose storing a forecasted performance value or a theoretical performance value.

Therefore, Dalal fails to teach or suggest "storing previously, in the memory device, information on a forecasted performance value per unit time which is calculated from a capacity, a theoretical performance value, and information on the operation history of the volume of the disk group as an allocation target", "wherein the forecasted performance value is an average performance value per unit time based on the operation history of a capacity" and "wherein the theoretical

performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 2.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, namely Lowenthal, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal and Lowenthal in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Lowenthal discloses a method for improving the performance of large databases. However, there is no teaching or suggestion in Lowenthal of the volume allocating method as recited in claim 2 of the present invention.

One feature of the present invention, as recited in claim 2, includes a step of storing previously, in the memory device, information regarding a forecasted performance value per unit time, a theoretical performance value, and information regarding the operation history of the volume in the disk group as an allocation target. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history of a capacity. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. As conceded by the Examiner, Lowenthal does not disclose storing a forecasted performance value or a theoretical performance value.

Therefore, Lowenthal fails to teach or suggest "storing previously, in the memory device, information on a forecasted performance value per unit time which is calculated from a capacity, a theoretical performance value, and information on

the operation history of the volume of the disk group as an allocation target", "wherein the forecasted performance value is an average performance value per unit time based on the operation history of a capacity" and "wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 2.

The above noted deficiencies of Dalal in view of Lowenthal are not supplied by any of the other references of record, namely Leung, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal in view of Lowenthal and Leung in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

Leung discloses techniques for balancing capacity utilization in a storage environment. However, there is no teaching or suggestion in Leung of the volume allocating method as recited in claim 2 of the present invention.

Leung's techniques for balancing capacity utilization in a storage environment automatically determine when capacity utilization balancing is to be performed for a group of storage units in the storage environment. A source storage unit is determined from the group of storage units from which data is to be moved to balance capacity utilization. Ultilized-capacity balancing is performed by moving data files from the source storage unit to one or more target storage units in the group of storage units. The storage units in a group may be assigned to one or more servers.

One feature of the present invention, as recited in claim 2, includes a step of storing previously, in the memory device, information regarding a forecasted

performance value per unit time, a theoretical performance value, and information regarding the operation history of the volume in the disk group as an allocation target. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history of a capacity. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Leung does not disclose this feature.

To support the assertion that Leung teaches storing a forecasted performance value, the Examiner cites paragraph [0141]. The cited text describes the steps used to calculate a storage value score (SVS). The SVS is calculated by multiplying a bandwidth factor by the different between a desired threshold percentage and a current usage percentage. The resulting product is then divided by the cost. The disclosed equation of Leung, which is used to calculate the SVS, is entirely different from storing a forecasted performance value, where the forecasted performance value is an average performance value per unit time based on the operation history of a capacity, as claimed. Accordingly, Leung does not teach the claimed feature.

To support the assertion that Leung teaches storing a theoretical performance value, the Examiner cites paragraph [0142], lines 1-5 and paragraph [0143], lines 1-18. The cited text describes a desired threshold for a storage system, the current usage value, and the cost. The cited text further describes the use of determining the availability of a storage unit in calculating a storage value score. These features of Leung are quite different from storing a theoretical performance value, where the theoretical performance value is a performance value at which the disk group

theoretically exhibits maximum performance, as claimed. Accordingly, Leung does not teach the claimed feature.

Therefore, Leung fails to teach or suggest "storing previously, in the memory device, information on a forecasted performance value per unit time which is calculated from a capacity, a theoretical performance value, and information on the operation history of the volume of the disk group as an allocation target", "wherein the forecasted performance value is an average performance value per unit time based on the operation history of a capacity" and "wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 2.

Independent Claims 4, 9 and 11

The present invention, as recited in claim 4 and as similarly recited in claims 9 and 11, provides a storage management server for managing the operation of a storage device connected via a network. The storage management server includes a database for operation history that stores historical information including a performance value of a disk group obtained upon operation of the storage device. The storage management server also includes a database for volume performance value that stores specification values, including the performance, reliability, and a capacity of the storage device obtained from the storage device. The storage management server further includes a policy database that stores information on policies including the performance corresponding to a plurality of set policies. Also included in the storage management server is a first processing means that calculates performance value using the information on the performance value of the

disk group stored in the database for operation history. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. The storage management server also includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. According to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Furthermore, the storage management server includes a volume determination processing means that determines an allocation candidate for allocating the volume in accordance with a calculation result of the second processing means. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by Dalal, Lowenthal or Leung, whether taken individually or in combination with each other.

As previously discussed, Dalal discloses a language for expressing storage allocation requirements. However, there is not teaching or suggestion in Dalal of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11.

One feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a first processing means that calculates performance value using the information on the performance value of the disk group stored in the database for operation history. According to the present invention, the

forecasted performance value is an average performance value per unit time based on the operation history. As conceded by the Examiner, Dalal does not disclose a first processing means.

Another feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. According to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Dalal does not disclose this feature. To support the assertion that Dalal discloses a second processing means that obtains a performance margin, the Examiner cites paragraph [0119], lines 6-14. Based on the remarks of a previous rejection, the Examiner appears to rely upon the "performance parameters" of Dalal as corresponding to the "performance margin" of the present invention. However, a performance parameter and a performance margin are quite different. Specifically, the capabilities such as reliable, high performance, and snapshot-capable, of Dalal do not amount to a performance margin of the present invention. Furthermore, and as conceded by the Examiner, Dalal does not disclose where a performance margin is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, in the manner claimed.

Therefore, Dalal fails to teach or suggest "first processing means which calculates a forecasted performance value from the information on the performance value of the disk group stored in the database for operation history, wherein the forecasted performance value is an average performance value per unit time based

on the operation history" as recited in claim 4, and as similarly recited in claims 9 and 11.

Furthermore, Dalal fails to teach or suggest "second processing means which obtains a performance margin, based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 4, and as similarly recited in claims 9 and 11.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, namely Lowenthal, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal and Lowenthal in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Lowenthal discloses a method for improving the performance of large databases. However, there is no teaching or suggestion in Lowenthal of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11 of the present invention.

One feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a first processing means that calculates performance value using the information on the performance value of the disk group stored in the database for operation history. According to the present invention, the forecasted performance value is an average performance value per unit time based

on the operation history. Lowenthal does not disclose this feature, and the Examiner does not rely upon Lowenthal for teaching a first processing means.

Another feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. According to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Lowenthal does not disclose this feature, and the Examiner does not rely upon Lowenthal for teaching a second processing means.

Therefore, Lowenthal fails to teach or suggest "first processing means which calculates a forecasted performance value from the information on the performance value of the disk group stored in the database for operation history, wherein the forecasted performance value is an average performance value per unit time based on the operation history" as recited in claim 4, and as similarly recited in claims 9 and 11.

Furthermore, Lowenthal fails to teach or suggest "second processing means which obtains a performance margin, based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 4, and as similarly recited in claims 9 and 11.

The above noted deficiencies of Dalal in view of Lowenthal are not supplied by any of the other references of record, namely Leung, whether taken individually or

in combination with each other. Therefore, combining the teachings of Dalal in view of Lowenthal and Leung in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Leung discloses techniques for balancing capacity utilization in a storage environment. However, there is no teaching or suggestion in Leung of the storage management server or the program for selecting and generating a volume candidate, as recited in claims 4, 9 and 11 of the present invention.

One feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a first processing means that calculates performance value using the information on the performance value of the disk group stored in the database for operation history. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. Leung does not disclose this feature. To support the assertion that Leung discloses this feature, the Examiner cites paragraph [0142], lines 1-5 and paragraph [0143], lines 1-18. The cited text describes a desired threshold for a storage system, the current usage value, and the cost. The cited text further describes the use of determining the availability of a storage unit in calculating a storage value score. These features of Leung are quite different from the first processing means of the present invention. For example, Leung does not teach or suggest calculating a forecasted performance value, where the forecasted performance value is an average performance value per unit time based on the

operation history, as claimed. Accordingly, Leung does not teach the claimed feature.

Another feature of the present invention, as recited in claim 4, and as similarly recited in claims 9 and 11, includes a second processing means that obtains a performance margin, which is based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means. According to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Leung does not disclose this feature. To support the assertion that Leung teaches the use of a theoretical performance value and the forecasted performance value to obtain a performance margin, the Examiner again cites paragraph [0142], lines 1-5 and paragraph [0143], lines 1-18. As previously discussed, the cited text describes a desired threshold for a storage system, the current usage value, and the cost. The cited text further describes the use of determining the availability of a storage unit in calculating a storage value score. These features of Leung are quite different from the second processing means of the present invention. For example, Leung does not teach or suggest the use of a theoretical performance value, where the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance, in the manner claimed. Accordingly, Leung does not teach the claimed features.

Therefore, Leung fails to teach or suggest "first processing means which calculates a forecasted performance value from the information on the performance value of the disk group stored in the database for operation history, wherein the

forecasted performance value is an average performance value per unit time based on the operation history" as recited in claim 4, and as similarly recited in claims 9 and 11.

Furthermore, Leung fails to teach or suggest "second processing means which obtains a performance margin, based on a theoretical performance value of the volume and the forecasted performance value obtained by the first processing means, wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 4, and as similarly recited in claims 9 and 11.

Independent Claim 19

The present invention, as recited in claim 19, provides a volume allocating method in a storage management system. The method includes a step of receiving a condition on requested performance per operating time zone of a volume designated by a client. The method also includes referring to history information obtained from a result of actually operating disk groups, and calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. The method also includes the steps of obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a

calculation result, and presenting the at least one volume candidate to the client. The method also includes receiving and storing one volume candidate selected by the client. The prior art does not disclose all these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by Dalal, Lowenthal or Leung, whether taken individually or in combination with each other.

As previously discussed, Dalal discloses a language for expressing storage allocation requirements. However, there is no teaching or suggestion in Dalal of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

One feature of the present invention, as recited in claim 19, includes calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Dalal does not disclose this feature, and the Examiner does not rely upon Dalal for teaching the calculation of a performance margin.

Another feature of the present invention, as recited in claim 19, includes obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the at least one volume candidate to the client. Dalal does not disclose this feature. The

Examiner asserts that Dalal discloses obtaining a volume candidate as an allocation target from the disk groups, but concedes that Dalal does not disclose where the volume candidate is obtained in accordance with a result of calculating the performance margin and presenting the volume candidate to the client. Applicants agree that Dalal does not teach where a volume candidate is obtained in accordance with a result of calculating the performance margin, in the manner claimed.

Therefore, Dalal fails to teach or suggest "calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value" and "wherein the forecasted performance value is an average performance value per unit time based on the operation history" and "wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 19.

Furthermore, Dalal fails to teach or suggest "obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the at least one volume candidate to the client" as recited in claim 19.

The above noted deficiencies of Dalal are not supplied by any of the other references of record, namely Lowenthal, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal and Lowenthal in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Lowenthal discloses a method for improving the performance of large databases. However, there is no teaching or suggestion in

Lowenthal of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

One feature of the present invention, as recited in claim 19, includes calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Lowenthal does not disclose this feature. To support the assertion that Lowenthal teaches the calculation of a performance margin, the Examiner cites column 11, lines 23-54. However, the cited text merely describes where disk performance parameters are used for performing normalization are stored in a schema data store. The disclosed "parameters" do not amount to a "margin" as claimed. Specifically, Lowenthal does not teach or suggest subtracting a forecasted performance value from a theoretical performance value to obtain a performance margin, in the manner claimed. Accordingly, Lowenthal fails to teach or suggest calculating a performance margin as claimed.

Another feature of the present invention, as recited in claim 19, includes obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the at least one volume candidate to the client. Lowenthal does not disclose this feature, and the Examiner does not rely upon Lowenthal for teaching this feature.

Therefore, Lowenthal fails to teach or suggest "calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value" and "wherein the forecasted performance value is an average performance value per unit time based on the operation history" and "wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 19.

Furthermore, Lowenthal fails to teach or suggest "obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the at least one volume candidate to the client" as recited in claim 19.

The above noted deficiencies of Dalal in view of Lowenthal are not supplied by any of the other references of record, namely Leung, whether taken individually or in combination with each other. Therefore, combining the teachings of Dalal in view of Lowenthal and Leung in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Leung discloses techniques for balancing capacity utilization in a storage environment. However, there is no teaching or suggestion in Leung of the volume allocating method in a storage management system of the present invention, as recited in claim 19.

One feature of the present invention, as recited in claim 19, includes calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical

performance value. According to the present invention, the forecasted performance value is an average performance value per unit time based on the operation history. Also according to the present invention, the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance. Leung does not disclose this feature, and the Examiner does not rely upon Leung for teaching this feature.

Another feature of the present invention, as recited in claim 19, includes obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of calculating the performance margin and presenting the at least one volume candidate to the client. Leung does not disclose this feature. To support the assertion that Leung teaches calculating the performance margin and presenting the volume to the client candidate, the Examiner cites paragraph [0147], lines 7-15. However, neither the cited text nor any other portions of Leung teach or suggest calculating a performance margin by subtracting a forecasted performance value from a theoretical performance value, as in the present invention.

Therefore, Leung fails to teach or suggest "calculating a performance margin of each disk group upon allocating the volumes of the disk groups by subtracting a forecasted performance value from a theoretical performance value" and "wherein the forecasted performance value is an average performance value per unit time based on the operation history" and "wherein the theoretical performance value is a performance value at which the disk group theoretically exhibits maximum performance" as recited in claim 19.

Furthermore, Leung fails to teach or suggest "obtaining at least one volume candidate as an allocation target from the disk groups in accordance with a result of

calculating the performance margin and presenting the at least one volume candidate to the client" as recited in claim 19.

Each of Dalal, Lowenthal and Leung suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the teachings of Dalal, Lowenthal and Leung in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 2-17, 19 and 20 as being unpatentable over Dalal in view of Lowenthal, further in view of Leung are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 2-17, 19 and 20.

In view of the foregoing amendments and remarks, Applicants submit that claims 1-20 are in condition for allowance. Accordingly, early allowance of claims 1-20 is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Mattingly, Stanger, Malur & Brundidge, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. 520.43064X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.

Donna K. Mason

Donna K. Mason
Registration No. 45,962

DKM/cmd
(703) 684-1120